

Remarks/Arguments

In the Office Action dated December 12, 2007, it is noted that claims 1-19 are pending; that claims 1-19 stand rejected under 35 U.S.C. §103; that the drawings filed on January 17, 2002 have been accepted; that the claim for foreign priority under 35 U.S.C. §119 has been acknowledged and all the certified copies of priority documents have been received.

Cited Art

The following references have been cited and applied against the claims: U.S. Patent 6,037,984 to Isnardi et al. (hereinafter referenced as "*Isnardi*"), U.S. Patent 6,373,960 to Conover et al. (hereinafter referenced as "*Conover*"), and an article entitled, "*Digital Watermarking of MPEG-2 Coded Video In The Bitstream Domain*", by Hartung et al. listed as both *Reference AL* on Applicant's IDS and *Reference U* on Examiner's *Notice of References Cited* (hereinafter referenced as "*Hartung*").

Rejection of Claims 1-2, 6, 8-10, 14, and 16-18 under 35 U.S.C. §103

Claims 1-2, 6, 8-10, 14, and 16-18 stand rejected under 35 U.S.C. §103 as being unpatentable over Isnardi in view of Conover. This rejection is respectfully traversed.

Claims 1, 8, and 9 are independent base claims. Claims 2 and 6 depend directly from claim 1; and claims 10, 14, and 16-18 depend ultimately from claim 9. Claims 1, 8 and 9 include substantially similar limitations that are patentably distinguishable from the cited art. Accordingly, the remarks below will focus on claim 1, and are intended to apply uniformly to claims 8 and 9 without further express reference thereto.

The claimed invention is related to watermarking a compressed information signal. In an exemplary embodiment, the watermark information is added to the compressed information signal **only if** the addition of the watermark information increases the length of a repeating stream, thereby increasing the compression efficiency of the run-length encoding (*see Applicant's specification at FIG. 3F and page 1, line 26 - page 2, line 3*). Because conventional run-length encoders are generally optimized for encoding runs of zeros, the watermark information is preferably added **only if** the addition results in an increase in the number of zeros input to the run-

length encoder (see *Applicant's specification at FIG. 3E; page 4, lines 11-14, lines 22-26*). Because it is desirable that the watermark modifications produce a minimal impact on the ultimate compressed information signal, the watermark information is added **only if** the information signal has the smallest value other than zero (e.g., ± 1) (see *Applicant's specification at FIG. 3E; page 5, lines 16-19*).

As defined in independent claim 1, the claimed subject matter comprises a method (see *Applicant's specification at Figs. 3A-3G*) of embedding a watermark (see *Applicant's specification at FIG. 3D*) in an information signal (see *Applicant's specification at FIG. 3A*) which is compressed so as to include first signal samples having a first value and second signal samples having a second value (see *Applicant's specification at page 4, lines 4-8*). The method comprises the act of modifying at least one of the first and second signal samples in accordance with a watermark pattern to produce a modified signal sample (see *Applicant's specification at FIG. 3E; page 4, lines 8-11*), wherein the act of modifying is applied to at least one of the first and second signal samples only if the modified signal sample equals zero (see *Applicant's specification at page 4, lines 11-14*).

As admitted on page 3 of the present Office Action, Isnardi fails to teach modifying a signal sample in accordance with a watermark pattern **only if** the modified signal sample equals zero, as specifically defined in claim 1. It is said in the Office Action that Conover was added to Isnardi to remedy this deficiency in Isnardi.

Isnardi appears to teach a watermarking method that includes an intermediate step of masking a signal sample by setting specific coefficients in the signal to zero before the watermark information is added to the masked signal sample for those specific (now zero valued) coefficients:

The watermark mask 118 selects certain ones of the quantized DCT coefficients and sets the value of each selected coefficient to zero. A control signal, produced by the watermark generator, defines the particular coefficients that are to be masked. The masked array of coefficients containing the "zeroed" coefficients is coupled to the embedded decoder 116 and used to produce a predicted image.

The masked block of DCT coefficients is coupled to the watermark inserter 120, where the zeroed coefficients are replaced with watermark coefficients. The watermark coefficients are supplied by the watermark control signal." (See Isnardi, col. 4, lines 23-34).

Clearly, as allegedly taught by Isnardi, all of the DCT coefficients corresponding to the watermark coefficient locations are set to zero via masking, then the watermark

information is added to these masked coefficient locations in the information signal. That is, the watermark coefficients unconditionally replace the selected signal coefficients corresponding to the watermark. At col. 2, lines 9-12, Isnardi makes it abundantly clear that his method and apparatus are designed to overcome the deficiencies in the prior art and maintain all the elements of a watermark when combining the watermark with the information signal. To wit, Isnardi states that:

Therefore, a need exists in the art for a watermarking technique that does not remove any amount of watermark signal to facilitate watermarking a video sequence without exceeding a predefined bit budget.

The addition of Conover to Isnardi is improper because their teachings are oppositely directed. In contrast to Isnardi, Conover does not unconditionally force each coefficient in the information signal corresponding to a watermark coefficient location to bear the watermark coefficient value or to be combined somehow with the watermark coefficient value. See *Conover at the Abstract and at col. 6, lines 2-14*. Conover states that his embedding technique involves selecting certain, but not all, coefficient locations in the information signal corresponding to the watermark coefficient locations for modification by the watermark. As such, Conover's teachings are completely at odds with the express teachings of Isnardi because Isnardi requires that all elements of a watermark be incorporated into the information signal unconditionally. There is no motivation in the references themselves to make the suggested combination.

Even assuming, *arguendo*, that the combination of Isnardi and Conover were considered to be properly motivated, an assumption with which Applicants neither agree nor acquiesce to, the resulting combination does not operate in a manner even remotely resembling Applicant's claimed invention and it does not make Applicant's claimed invention obvious. In modifying the DCT coefficients, Conover makes it clear in the Abstract, at col. 6, lines 6-10, and at col. 10, lines 6-9, that:

... the DCT coefficient to be modified preferably has a run-length of zero (0).

While various criteria described in greater detail below affect the selection of apt sites for watermarking, such sites are preferably located in MPEG B frames 26, and the DCT coefficient to be modified preferably has a run-length of zero (0).

Similarly, as set forth above, VLCs 64 having a zero (0) run-length are to be preferred because a watermark embedded in such a VLC 64 modifies a coefficient for only a single basis cosine curve.

So the combination with Conover would only modify a DCT coefficient when it has a **run-length** of zero. There is no teaching in the combined references that the modification would occur "only if the modified signal sample equals zero," as claimed. The combined references fail to teach that their modification would cause the DCT coefficient to be equal to zero. A **run length of zero**, as taught by Conover, is not even remotely suggestive of the **modified signal sample being equal to zero**, as defined in Applicant's claims.

It is indisputable that Conover, alone or in combination with Isnardi, modifies the DCT coefficient in a way that produces a non-zero result for the modified coefficient. At col. 11, lines 32-44, Conover suggests that the sign of the coefficient be reversed. As such, the coefficient being generated by such a modification in Conover is still non-zero, in contrast to Applicant's zero coefficient in the modified signal sample.

In light of the remarks above and in view of the remarks above with respect to the substantial similarity between the limitations in claims 8 and 9, it is believed that the claims 1, 8 and 9 and the claims dependent thereon would not have been obvious to a person of ordinary skill in the art upon a reading of Isnardi and Conover, either separately or in combination. Therefore, it is submitted that claims 1-2, 6, 8-10, 14, and 16-18 are allowable under 35 U.S.C. §103. Withdrawal of this rejection is respectfully requested.

Rejection of Claims 3-5, 7, 11-13, 15, and 19 under 35 U.S.C. §103

Claims 3-5, 7, 11-13, 15, and 19 stand rejected under 35 U.S.C. §103 as being unpatentable over Isnardi in view of Conover and further in view of Hartung. This rejection is respectfully traversed.

As stated above, claims 1 and 9 are independent base claims. Claims 3-5 and 7 depend ultimately from claim 1; and claims 11-13, 15, and 19 depend ultimately from claim 9. Also as stated above, claims 1 and 9 include substantially similar limitations that are patentably distinguishable from the cited art. Thus, the remarks below will focus on the method claim set, and are intended to apply uniformly to claim 9 and its dependent claims without further express reference thereto.

It should be noted that Hartung does not remedy the deficiencies noted above with respect to the combined teachings in Conover and Isnardi. Hartung does not

teach, show, or suggest that "the act of modifying is applied to at least one of the first and second signal samples only if the modified signal sample equals zero," as defined in Applicant's independent base claims. Therefore, the combination of Isnardi, Conover, and Hartung does not teach, show, or suggest all the elements of Applicant's claimed invention.

Moreover, the combination of Hartung with Isnardi and Conover is improper. In fact, Isnardi clearly teaches away from the teachings of Hartung. See *Isnardi at col. 1, line 26 through col. 2, line 12*. Hartung is said by Isnardi to modify the DCT information signal with less than the entire watermark, and Isnardi seeks to remedy that problem by not removing any portion of the watermark signal in modifying the DCT information signal. See *Isnardi at col. 2, lines 9-12*. Accordingly, Isnardi is diametrically opposed to the teachings of Hartung and cannot be combined with Hartung. There is clearly no motivation in the references themselves to make this combination.

In light of the remarks directly above and in view of the remarks above with respect to claim 1 and the similarity between the limitations in claim 9, it is believed that the claims 3-5, 7, 11-13, 15, and 19 would not have been obvious to a person of ordinary skill in the art upon a reading of Isnardi, Conover, and Hartung, either separately or in combination. Therefore, it is submitted that claims 3-5, 7, 11-13, 15, and 19 are allowable under 35 U.S.C. §103. Withdrawal of this rejection is respectfully requested.

Conclusion

In view of the foregoing, it is respectfully submitted that all the claims pending in this patent application are in condition for allowance. Reconsideration and allowance of all the claims are respectfully solicited.

If, however, the Examiner believes that there are any unresolved issues requiring adverse final action in any of the claims now pending in the application, it is requested that the Examiner contact the Applicant's attorney at (914) 333-9602, so that a mutually convenient date and time for a telephonic interview may be scheduled for resolving such issues as expeditiously as possible.

In the event there are any errors with respect to the fees for this response or any other papers related to this response, the Director is hereby given permission to charge

any shortages and credit any overcharges of any fees required for this submission to
Deposit Account No. 14-1270.

Respectfully submitted,

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